

Dietary and Weight Changes During COVID-19 Pandemic in Afghanistan

Ahmad Mujtaba Barezai^{1*}, Beheshta Baraki², Marhaba Barezai³

¹Department of Community Nutrition, Ghazanfar Institute of Health Science, Ministry of public health, Kabul, Afghanistan; ²Department of gynecology in Adei Maternity Hospital, Kabul, Afghanistan; ³Departement of Public Nutrition, Public health faculty of Kabul University of Medical Science, Kabul, Afghanistan

ABSTRACT

Background: During the coronavirus disease 2019 (COVID-19), the lifestyle of most people especially diet and body weight changed. Therefore, we aimed to examine the dietary and weight changes during the COVID-19 pandemic in Afghanistan.

Methods: The current study is an online survey among the Afghan population in Afghanistan, which was conducted on 3200 Afghan adults (2800 men and 400 women) ages 18-60 years between 15 August 2020 and 10 May 2021. The inclusion criteria were age over 18 years old, both genders, interest participants in the study, and internet access. The age under 18 years old, pregnant and breastfeeding women was not included in this study.

Results: (12.5%) of study participants were females. Almost (56.34% from 3200 participants) of the study population decreased their body weight. Additionally, over half percent of study participants increased the consumption of fruits (93.12%), vegetables (57.28%), legumes (59.03%), tea (61.34%), coffee (53.96%), pepper (57.38%), boiled food (69.05%) and supplements (87.46%).

Conclusion: We found that food intake increased. Moreover, the body weight decreased due to the COVID-19 pandemic among Afghan participants.

Keywords: Dietary intake; Body weight; COVID-19 pandemic

INTRODUCTION

The coronavirus disease 2019 (COVID-19) was informed on 31 December 2019 in Wuhan the capital city of Hubei province in China, which rapidly spreading outside China and the Asian continent, and it was declared a pandemic in March 2020, according to recent reports [1-3]. In Afghanistan, the first case of COVID-19 was confirmed on 24 February 2020, which was a 35 years old man from Herat province [4,5]. Additionally, the three new cases of COVID-19 were confirmed on 7 March in Heart province [6,7]. On 10 March, the new case was reported oversight of the Heart province [4]. Besides, the first death due to COVID-19 was a 40-year-old man from Balkh province on 22 March [5]. As the number of cases was increasing rapidly, the ministries of public health and education decided that some provinces become lockdown and the school and university lessons would be taught online [8]. There are several concerns to control the COVID-19 in Afghanistan. For instance, the entrance of Afghan refugees from neighboring countries like Iran and Pakistan every day, non-compliance with frequent hand washing with sanitizer and soap, attending parties, low economics, lack of use of the mask, low

health education, shaking hands, and hugging in communities as a whole [9-12].

According to recent research, COVID19 has been associated with dietary changes, physical activity, sleep disorders, psychological and emotional disturbances among women and men. For instance, several studies demonstrated that physical activity decreased during COVID-19 among both gender [13,14]. Cross-sectional studies revealed that weight gain was associated with the high intake of unhealthy foods, high intake of alcohol consumption, and decreases physical activity due to the COVID 19 [15-17]. Additionally, several studies demonstrated that the risk of stress and depression diseases increases during COVID 19 and is associated with high intakes of fats, fried foods, pizza, and beverages [18-20]. On the other hand, several studies revealed that a high intake of fresh fruits, vegetables, eggs, legumes increased during the COVID-19 [21-23]. According to recent studies, a high intake of healthy foods, vitamins, and minerals could play a role against the COVID19 patients and increase the immune system of the human body [24-26].

To the best of our knowledge, there is no study investigating the

Correspondence to: Ahmad Mujtaba Barezai, Department of Public Nutrition, Ghazanfar Institute of Health Sciences (GIHS), Telephone: +93784913193; Email: mujtaba.barezai.7@gmail.com

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changes in dietary intake and body weight during COVID-19 in Afghanistan. Therefore, we aimed to examine the dietary intake and weight changes during the COVID-19 pandemic among Afghan adults in Afghanistan.

MATERIALS AND METHODS

The current study is an online survey among the Afghan population in Afghanistan, which was conducted on 3200 Afghan adults (2800 men and 400 women) ages 18-60 years between 15 August 2020 and 10 May 2021. All participants provided an online written consent, which was voluntary. To collect all data, we created using the Google forms, which were in the national language of Afghanistan (Dari and Pashto) and shared in social media such as Facebook, Instagram, and WhatsApp.

Inclusion criteria

The age over 18 years old, both genders, the interest of participants in the study, and internet access.

Non-inclusion criteria

The age under 18 years old, pregnant and breastfeeding women were not included in the study.

Study setting

This study was done as an online survey in all provinces of Afghanistan in the period between 15 August 2020 and 10 May 2021.

The demographic data

Included age, gender, marital status, BMI, place of residence, job, smoking status, ethnicity, SES (Socio-Economic Status), medicine use, history of diseases, number of children, type of living, and physical activity was measured by 0 for None, 1 for Low (<0.5h/d), 2 for moderate (0.5-2h/d) and 3 for high (>2h/d). The weight and height were used for the body mass index, which was calculated as weight (kg) divided by height squared (m²). Additionally, body weight changes were divided into three parts (0 for no changes, 1 for increased, and 2 for decreased).

The dietary intake

Include rice, fruits, vegetables, legumes, dried fruits, kebab food, fried food, boiled food, fast food, fast foods, fatty foods, red and proceed meat, sweets, coffee, tea, fish, dairy, beverages, supplements use (vitamin C, D, E and B complex).

Data analysis

We presented the categorical variables in frequency (n) and percent (%). The chi-square was used to analyze the body weight changes. All the statistical analyses were carried out using SPSS (SPSS Inc., version 24). The questionnaires took around 15 minutes to complete.

RESULTS

Out of 17300 sent the links, 6240 participants' responses were received, and only 3200 (men=2800 and women=400) participants completed the answers. The General characteristics of study participants are presented in Table 1.

The (87.5%) of study participates were males, (49.2%) males were between age 18 and 29 years old, (19.33%) males were between 30 and 39 years old, (27.46%) of males were between 40 and 49 years old, and (4.01%) males were older than 49 years old. The

Table 1: General characteristics of study participants.

Variables	Frequency (n=3200)	Percent (100%)
Age in year		
18-29	1580	49.2
30-39	895	28
40-49	699	22
≥ 50	26	0.8
Gender		
Male	2800	87.5
Female	400	12.5
BMI		
Underweight	150	4.68
Normal weight	858	26.81
Over weight	1893	59.15
Obese	299	9.34
Marital status		
Single	1025	32.03
Married	2100	65.62
Divorced/Widow	75	2.34
Residence		
Kabul	1299	40.59
Nangarhar	18	0.56
Kunar	2	0.06
Herat	836	26.12
Kapisa	15	0.46
Mazar Sharif	552	17.25
Baghlan	81	2.53
Logar	235	7.34
Laghman	19	0.59
Paktia	8	0.25
Panjsher	105	3.28
Parwan	30	0.93
Ethnicity		
Pashtun	1339	41.84
Tajik	1534	47.93
Hazara	289	9.05
Turkmen	33	1.03
Uzbek	5	0.15
Occupation		
Worker	1896	59.25
Driver	89	2.7
Doctor	3	0.093
Engineer	7	0.21
Nurse	15	0.46
Teacher	256	8
No job	934	29.16
Smoking		
Non-smoker	885	27.65
Less than 3 cigarettes a day	256	8
3-5 cigarettes a day	479	14.96
6-9 cigarettes a day	1256	39.25
≥10 cigarettes a day	324	10.12
Medicine usage		
None	989	30.9

Ibuprofen	325	10.15
methadone	559	17.46
Paracetamol	1159	36.21
Tramadol	168	5.25
History of diseases		
No history of diseases	2325	72.65
Diabetics	413	12.9
Hypertension	273	8.53
Depression	189	5.9
Number of children		
No	199	6.21
1-2	853	26.65
3-5	923	28.84
>5	1225	38.28
Physical activity		
None	2893	90.4
Low(<0.5 h/d)	193	6.03
Moderate(0.5 h/d-2 h/d)	85	2.65
High (>2 h/d)	29	0.9
SES		
Low	1156	36.12
Middle	1769	55.28
High	275	8.59
Type of living		
In a house with a garden or yard	3089	96.53
In an apartment/a house with no garden or yard	111	3.46

Abbreviations: SES (Social-Economic Status) and BMI (Body Mass Index)

(12.5%) of study participants were females, 79.5% females were between 18 and 29 years old, and (20.5%) females were older than 29 years old. Over half of the study participants (65.62%) were married. Rendering to BMI, (59.15%) were overweight, (26.81%) were normal weight, (9.34%) were obese and (4.68%) were underweight. The most commonplace of residence was Kabul (40.59%), followed by Herat (26.12%), Mazar Sharif (17.25%), Logar (7.34%), Panjsher (3.28), Baghlan (2.53%), Parwan (0.93%), Laghman (0.59%), Nangarhar(0.56%), Kapisa (0.46%), Paktia (0.25%), and Kunar (0.06). The (47.92%) of the population were Tajik, followed by, Pashtun (41.84%), Hazara (9.05%), Turkmen (1.03%), and Uzbek (0.15%). Over half of the population (59.25%) were workers, and (29.16%) were jobless. In terms of smoking, (27.65%) of the study population were non-smokers. (36.21%) of participants used the paracetamol, and (72.65%) had no history of diseases. Among the study participants, (6.21%) had no children, (26.65%) had 1 or 2 children, (28.84%) had 3 or 5 children, and (38.28%) had over 5 children. According to physical activity, (90.4%) of study participants had not physical activity, (6.03%) had low (<0.5 h/d) physical activity, (2.65%) had moderate (0.5 h/d-2 h/d) physician activity and (0.9%) had High (>2 h/d). In terms of social-economic status, (36.12%) had low economic, (55.28%) had middle economic and (8.59%) had high economic. According to the type of living, (96.53%) of participants living in a house with a garden or a yard, and (3.46%) living in an apartment/a house with no garden or yard.

Bodyweight changes of the study participants, by gender, are presented in Table 2.

Table 2: Bodyweight changes of study participants, by gender.

	Total		Men		Women	
	n=3200	100%	n=2800	87.50%	n=400	12.50%
Increased	563	17.59	489	17.46	74	18.5
Decreased	1803	56.34	1742	62.21	61	15.25
No changes	834	26.06	569	20.32	265	66.25

n=Frequency

Table 3: The percentage of consumption of foods of the study participants.

Food Items	Increased	Decreased	No changes
	Percentages (%)		
Rice	27.78	7.04	65.18
Fish	0.5	62.12	37.73
Fruits	93.12	0.46	6.4
Vegetables	57.28	30.7	11.93
Dairy	6.24	1.84	91.91
Legumes	59.03	0.59	40.37
Dried fruits	2.34	22.57	75.09
Tea	61.34	20.96	17.68
Coffee	53.96	32.78	13.25
Red and processed meat	20.9	37.59	41.5
Pepper	57.38	22.56	20.15
Fatty foods	12.65	65.05	22.3
Sweets	4.15	80.09	15.75
Fast-food	2.09	99.05	6.84
Beverages	22.8	63.09	14.11
Kebab food	1.75	78.16	20.09
Fried food	13.85	59.03	27.12
Boiled food	69.05	15.87	15.08
Supplements	87.46	1.96	10.58

Almost (56.34% from 3200 participants) of the study population decreased body weight. In terms of increased body weight in men were (17.46%) and in women were (18.5%). According to no changes, body weights in men were (20.32%) and in women were (66.25%).

The percentage of consumption of foods of the study participants is presented in Table 3.

Over half of the study participants did not change in the intake of rice (65.18%), dairy (91.91%), and dried fruits (75.09%). In terms of decreasing the consumption of foods, over half percent of the population decreased the intake of fish (62.12%), fatty foods (65.05%), sweets (80.09%), fast food (99.05%), beverages (63.09%), kebab food (78.16%) and fried food (59.03). According to increase the consumption of foods, over half percent of study participants increased the consumption of fruits (93.12%), vegetables (57.28%), legumes (59.03%), tea (61.34%), coffee (53.96%), pepper (57.38%), boiled food (69.05%) and supplements (87.46%).

DISCUSSION

This online survey among the Afghan population demonstrated that dietary intakes and body weight changed during the COVID-19 pandemic. Our findings confirmed that the fruits vegetables,

legumes, tea, coffee, pepper, boiled food, and supplements increased among Afghan participants during COVID-19. Furthermore, the bodyweight of most participants during the COVID-19 was decreasing. To the best of our knowledge, this is the first online study of COVID-19 to demonstrate the changes in dietary intake and body weight during the COVID-19 pandemic among Afghan adults in Afghanistan.

To begin with, there are several factors associated with COVID-19. For instance, physical activity, sleep disorders, social-economic status, psychotic health, body weight, and dietary changes. Several studies demonstrated that physical activity decreased during COVID-19 among both gender [13,14,27]. In line with our findings, (90.4%) of study participants had no physical activity during this pandemic. However, a cross-sectional study revealed that physical activity at home during lockdown increased in Spain [28]. Furthermore, most of the studies study presented that the hour of sleeping was increased among the adult population, and changed the time of sleeping during lockdown [28-30]. As well, during the lockdown due to COVID-19, the risk of stress and depression were increase among both sexes, according to recent research [31,32]. On the other hand, in our study, we did not consider the sleep disorders and psychotic health among our population. Most studies demonstrated that dietary intake changed due to COVID-19 [33,34]. In line with our findings, several studies demonstrated that high intakes of healthy foods increase during the COVID-19 pandemic [35,36]. Furthermore, a case-control study revealed that high intake of fruits, vegetables, and meat increased among adults due to COVID-19 [37]. A recent study in Italy presented that diet patterns changed among children and adolescents, and the intake of potato, chips, red meat, and sugar drinks increased during COVID-19 [38]. Moreover, a cross-sectional study revealed that intake of fatty foods and sweets was decreased due to COVID-19 [39]. Other cross-sectional studies demonstrated that the intake of fast food and beverages decreased during the lockdown [40,41]. In addition, a cross-sectional study presented that healthy food increase during the COVID-19 after recommended [42]. According to recent research, a high intake of vegetables, supplements, and fruits was increased among all generations [43]. On the other hand, most studies demonstrated that intake of unhealthy foods increased during the COVID-19 among both sex [44].

Furthermore, the bodyweight of most participants during the COVID-19 decreased in Afghanistan despite the high intake of foods. In line with our findings, few studies revealed that body weight decreased during COVID-19 among the adult population [17,45,46]. For instance, a cross-sectional study demonstrated that food intakes were increased and the body weight and physical activity decreased [46]. Additionally, a cross-sectional study presented that consumption of alcohol increased, however, exercise and body weight decreased [47]. On the other hand, most of the studies revealed that weight gain increased during COVID-19. For example, Cross-sectional studies revealed that weight gain was associated with the high intake of unhealthy foods, and decreases physical activity due to the COVID 19 [16,48,49]. Moreover, most of the studies demonstrated that weight gain increased and the unhealthy diet decreased among the adult population [50,51].

The strength of our study, this is the first study to demonstrate the changes in dietary intake and body weight among adults in Afghanistan. On the other hand, the limitations of our study include first weight and height collected using self-report, which is

subject to reporting biases and errors. In addition, most people did not have internet access.

CONCLUSION

We found that food intake increased. Moreover, the body weight decreased due to the COVID-19 pandemic among Afghan participants.

STATEMENT OF AUTHORSHIP

Ahmad Mujtaba Barekzai contributed to conception, design, search statistical analyses, data interpretation, manuscript drafting, and supervised the study. Beheshta Baraki and Marhaba Barekzai contributed to data interpretation and manuscript drafting and data clearing. All authors approved the final manuscript for submission.

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DECLARATION OF INTEREST STATEMENT

The authors declare no personal or financial conflicts of interest.

REFERENCES

1. Han Y, Liu Y, Zhou L, Chen E, Liu P, Pan X, et al. Epidemiological assessment of imported coronavirus disease 2019 (COVID-19) cases in the most affected city outside of Hubei Province, Wenzhou, China. *JAMA Netw Open*. 2020;3:e206785.
2. Epidemiology working group for NCIP epidemic response, Chinese center for disease control and prevention. [The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China]. *Zhonghua Liu Xing Bing Xue Za Zhi*. 2020;41:145-151.
3. Baloch S, Baloch MA, Zheng T, Pei X. The coronavirus disease 2019 (COVID-19) pandemic. *Tohoku J Exp Med*. 2020;250:271-278.
4. Nikpouraghdam M, Jalali Farahani A, Alishiri G, Heydari S, Ebrahimnia M, Samadinia H, et al. Epidemiological characteristics of coronavirus disease 2019 (COVID-19) patients in IRAN: A single center study. *J Clin Virol*. 2020;127:104378.
5. Saeed KMI, Amiri W. Descriptive epidemiology of coronavirus disease 2019 in afghanistan. *Ghazanfar Med J*. 2020;1:1-10.
6. Osmani K, Shayan NA, Joya SA. Clinical features of patients with COVID-19 in herat province of afghanistan. *Sağlık ve Toplum Özel Sayı Temmuz*. 2020;1:1-10.
7. Manandhar S, Nakarmi P, Baniya N. A novel coronavirus emerging in world-key questions for developing countries and under developed countries. *North Am Acad Res*. 2020;3:473-497.
8. <https://pajhwok.com/2021/06/01/covid-19-closing-only-educational-centres-wont-work>
9. https://reliefweb.int/sites/reliefweb.int/files/resources/afg_sh_covid19_research_brief_july_2020.pdf
10. <https://www.crisisgroup.org/asia/south-asia/afghanistan/covid-19-afghanistan-compounding-crises>
11. https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Afghanistan
12. <http://www.emro.who.int/emhj-volume-27-2021/volume-27-issue-3/the-covid-19-pandemic-an-opportunity-to-strengthen-health-systems-in-afghanistan.html>
13. Castañeda-Babarro A, Arbillaga-Etxarri A, Gutiérrez-Santamaría B,

- Coca A. Physical activity change during COVID-19 confinement. *Int J Environ Res Public Health*. 2020;17:6878.
14. Sekulic D, Blazevic M, Gilic B, Kvesic I, Zenic N. Prospective analysis of levels and correlates of physical activity during COVID-19 pandemic and imposed rules of social distancing; Gender specific study among adolescents from Southern Croatia. *Sustainability*. 2020;12:4072.
 15. Kriaucioniene V, Bagdonaviciene L, Rodríguez-Pérez C, Petkeviciene J. Associations between Changes in Health Behaviours and Body Weight during the COVID-19 Quarantine in Lithuania: The lithuanian COVIDiet study. *Nutrients*. 2020;12:3119.
 16. Chopra S, Ranjan P, Singh V, Kumar S, Arora M, Hasan MS, et al. Impact of COVID-19 on lifestyle-related behaviours- a cross-sectional audit of responses from nine hundred and ninety-five participants from India. *Diabetes Metab Syndr*. 2020;14:2021-2030.
 17. Reyes-Olavarría D, Latorre-Román PÁ, Guzmán-Guzmán IP, Jerez-Mayorga D, Caamaño-Navarrete F, Delgado-Floody P. Positive and negative changes in food habits, physical activity patterns, and weight status during COVID-19 confinement: Associated factors in the chilean population. *Int J Environ Res Public Health*. 2020;17:5431.
 18. Landaeta-Díaz L, González-Medina G, Agüero SD. Anxiety, anhedonia and food consumption during the COVID-19 quarantine in Chile. *Appetite*. 2021;164:105259.
 19. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: Results of the ECLB-COVID19 international online survey. *Nutrients*. 2020;12:1583.
 20. Khademian F, Delavari S, Koohjani Z, Khademian Z. An investigation of depression, anxiety, and stress and its relating factors during COVID-19 pandemic in Iran. *BMC Public Health*. 2021;21:1-7.
 21. Di Renzo L, Gualtieri P, Pivari F, Soldati L, Attinà A, Cinelli G, et al. Eating habits and lifestyle changes during COVID-19 lockdown: An Italian survey. *J Transl Med*. 2020;18:229.
 22. Zhao A, Li Z, Ke Y, Huo S, Ma Y, Zhang Y, et al. Dietary diversity among Chinese residents during the COVID-19 outbreak and its associated factors. *Nutrients*. 2020;12:1699.
 23. Hirvonen K, Brauw A, Abate GT. Food consumption and food security during the COVID-19 pandemic in Addis Ababa. *American J Agri Econom*. 2021;103:772-789.
 24. Arshad MS, Khan U, Sadiq A. Coronavirus disease (COVID-19) and immunity booster green foods: A mini review. *Food Sci Nutr*. 2020;8:3971-3976.
 25. Boumediene KM, Nada B. The role of nutrition in strengthening immune system against newly emerging viral diseases: case of SARS-CoV-2. *North African J Food and Nutri Res*. 2020;4:240-244.
 26. Bae M, Kim H. Mini-review on the roles of Vitamin C, Vitamin D, and Selenium in the immune system against COVID-19. *Molecules*. 2020;25:5346.
 27. Barekzai AM, Aminianfar A, Mousavi SM, Esmailzadeh A. The association between dietary inflammatory potential and gastric cancer: A case control study. *Nutr Cancer*. 2021:1-10.
 28. Sánchez E, Lecube A, Bellido D, Monereo S, Malagón MM, Tinahones FJ. On behalf of the Spanish Society for the Study of Obesity. Leading factors for weight gain during COVID-19 lockdown in a Spanish population: A cross-sectional study. *Nutrients*. 2021;13:894.
 29. Sañudo B, Fennell C, Sánchez-Oliver AJ. Objectively-assessed physical activity, sedentary behavior, smartphone use, and sleep patterns pre-and during COVID-19 quarantine in young adults from Spain. *Sustainability*. 2020;12:5890.
 30. Cellini N, Conte F, De Rosa O, Giganti F, Malloggi S, Rey M, et al. Changes in sleep timing and subjective sleep quality during the COVID-19 lockdown in Italy and Belgium: age, gender and working status as modulating factors. *Sleep Med*. 2021;77:112-119.
 31. Novotný JS, Gonzalez-Rivas JP, Kunzová Š, Skladanā M, Pospíšilová A, Polcrová A, et al. Risk factors underlying COVID-19 lockdown-induced mental distress. *Front Psychiatry*. 2020;11:603014.
 32. Giannopoulou I, Efstathiou V, Triantafyllou G, Korkoliakou P, Douzenis A. Adding stress to the stressed: Senior high school students' mental health amidst the COVID-19 nationwide lockdown in Greece. *Psychiatry Res*. 2021;295:113560.
 33. Rolland B, Haesebaert F, Zante E, Benyamina A, Haesebaert J, Franck N. Global changes and factors of increase in caloric/salty food intake, screen use, and substance use during the early COVID-19 containment phase in the general population in France: Survey study. *JMIR Public Health Surveill*. 2020;6:e19630.
 34. Huber BC, Steffen J, Schlichtiger J, Brunner S. Altered nutrition behavior during COVID-19 pandemic lockdown in young adults. *European J Nutri*. 2020;60:2593-2602.
 35. Muscogiuri G, Barrea L, Savastano S, Colao A. Nutritional recommendations for COVID-19 quarantine. *Eur J Clin Nutr*. 2020;74:850-851.
 36. Marty L, de Lauzon-Guillain B, Labesse M, Nicklaus S. Food choice motives and the nutritional quality of diet during the COVID-19 lockdown in France. *Appetite*. 2021;157:105005.
 37. Trujillo-Mayol I, Guerra-Valle M, Casas-Forero N, Sobral MMC, Viegas O, Alarcón-Enos J, et al. Western dietary pattern antioxidant intakes and oxidative stress: Importance during the SARS-CoV-2/COVID-19 pandemic. *Adv Nutr*. 2021;12:670-681.
 38. Pietrobello A, Pecoraro L, Ferruzzi A, Heo M, Zoller T, Faith M, et al. Effects of COVID-19 lockdown on lifestyle behaviors in children with obesity living in Verona, Italy: A longitudinal study. *Obesity*. 2020;28:22861.
 39. Rodríguez-Leyva D, Weighell W, Edel AL, LaVallee R, Dibrov E, Pinneker R, et al. Potent antihypertensive action of dietary flaxseed in hypertensive patients. *Hypertension*. 2013;62:1081-1089.
 40. Bakaloudi DR, Jeyakumar DT, Jayawardena R, Chourdakis M. The impact of COVID-19 lockdown on snacking habits, fast-food and alcohol consumption: A systematic review of the evidence. *Clin Nutri*. 2021;4:1-20.
 41. Bennett G, Young E, Butler I, Coe S. The impact of lockdown during the COVID-19 outbreak on dietary habits in various population groups: A scoping review. *Front Nutr*. 2021;8:626432.
 42. <https://environhealthprevmed.biomedcentral.com/articles/10.1186/s12199-020-00901-5>.
 43. <https://www.intechopen.com/books/diabetes-mellitus-insights-and-perspectives/the-role-of-fruit-and-vegetable-consumption-in-human-health-and-disease-prevention>.
 44. Renzo L, Gualtieri P, Pivari F, Soldati L, Attina A, Cinelli G, et al. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *J Transl Med*. 2020;18:229.
 45. Chew HSJ, Lopez V. Global impact of COVID-19 on weight and weight-related behaviors in the adult population: A scoping review. *Int J Environ Res Public Health*. 2021;18:1876.
 46. Bakaloudi DR, Barazzoni R, Bischoff SC, Breda J, Wickramasinghe K, Chourdakis M. Impact of the first COVID-19 lockdown on body weight: A combined systematic review and a meta-analysis. *Clin Nutri*. 2021;21:S0261-5614.
 47. Lange KW, Nakamura Y. Lifestyle factors in the prevention of COVID-19. *Glob Health J*. 2020;4:146-152.

48. Cheikh Ismail L, Osaili TM, Mohamad MN, Al Marzouqi A, Jarrar AH, Abu Jamous DO, et al. Eating habits and lifestyle during COVID-19 lockdown in the United Arab Emirates: A cross-sectional study. *Nutrients*. 2020;12:3314.
49. Galali Y. The impact of COVID-19 confinement on the eating habits and lifestyle changes: A cross sectional study. *Food Sci Nutr*. 2021;9:2105-2113.
50. Martin JC, Moran LJ, Harrison CL. Diet quality and its effect on weight gain prevention in young adults: A narrative review. *Semin Reprod Med*. 2020;38:407-413.
51. Swinburn BA, Caterson I, Seidell JC, James WP. Diet, nutrition and the prevention of excess weight gain and obesity. *Public Health Nutr*. 2004;7:123-146.